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Application No. 10/534,802

Docket No.: 12810-00088-US

REMARKS

Claims 1-12 are now active in the specification. Claims 1-12 were rejected under 35 U.S.C. §103(a). The cited references do not render claims 1-12 obvious.

At the outset, Applicants note that there is a typographical error on page 2 of the Office Action. Reference Achhammer et al. was cited as U.S. Patent No. 5,495,501 and should have been cited as U.S. Patent No. 5,495,016 as listed on the PTO-892 form.

The present application relates a process for removing high boilers from crude caprolactam. The process involves reacting 6-aminocapronitrile with water to give a reaction mixture and removing ammonia and unconverted water from the reaction mixture to obtain crude caprolactam. The crude caprolactam is then fed into a distillation apparatus to obtain two substreams where the first substream is caprolactam product from the top and the second substream is a mixture of caprolactam and high boilers from the bottom. The pressure is set in the distillation apparatus such that the bottom temperature does not go below 170°C and the second substream is not less than 75% by weight caprolactam, based on the entire second substream. This second substream contains both caprolactam and high boilers.

As the Office has noted on page 2 of the Office Action the combination of the cited references Achhammer et al. (U.S. Patent No. 5,495,016) and Ritz et al. (U.S. Patent No. 5,693,793) do not teach or suggest a bottom temperature that does not go below 170°C and a second substream with a caprolactam content not less than 75% by weight. Accordingly, the claimed process would not have been obvious over the combination of Achhammer and Ritz.

This rejection of the claims under 35 U.S. C. §103(a) over the combination of Achhammer and Ritz is respectfully traversed.

Achhammer describes a process for the preparation of caprolactam. The process involves forming a mixture (mixture II) consisting essentially of caprolactam and high boilers (step b) and then separating the high boilers and caprolactam by distillation (step c). The isolated high boilers are then treated by any of the three separate treatments (steps d1, d2 or d3) (see column 1, lines 37-57). In this process the caprolactam and high boilers are "separated from one another by

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distillation" (column 1, line 46). In contrast, the claimed process maintains a mixture of caprolactam and high boilers in the second substream.

Ritz describes a process for preparing caprolactam by cyclization of 6-aminocapronitrile. Like Achhammer the process in Ritz involves separating caprolactam and high boilers and then subsequently treating the high boilers with an acid (abstract and column 3, lines 17-27). In contrast, the claimed process maintains a mixture of caprolactam and high boilers in the second substream.

Because both references do not teach or suggest a process which maintains a mixture of caprolactam and high boilers in a second substream, the claimed process would not have been obvious over the cited references. Specifically, the references do not teach or suggest all claim limitations of the claimed process as required to establish a case of obviousness (MPEP §2143.03). Accordingly, Applicants respectfully request that the Examiner withdraw the rejection.

Applicants acknowledge the argument made by the Office that "where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." In response, Applicants note that maintaining the caprolactam and high boiler concentration in the bottom of the distillation apparatus in a given range was not taught or suggested by the cited references. How can a range of conditions unknown in the prior art be optimized by routine experimentation? The processes described in the cited references taught separating these two products, and as such, the cited references teach away from the claimed process (MPEP §2143.03(VI)).

Finally, Applicants note that the claimed process gives unexpectedly advantageous or superior properties (MPEP §2144.09). This is demonstrated by the examples provided on pages 14 and 15 of the specification. The results of these examples are summarized in the following Table.

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	Bottom temperature (°C)	Content of caprolactam (% by weight)	Content of high boilers (% by weight)	Deposit in column
Example 1	190	75	25	No deposit after more than one month
Com. Example 1	190	20	80	Deposit after 2 days
Com. Example 2	150	75	25	Deposit after 12 hours

Inspection of the data shows that the amount of deleterious deposits in the column can be eliminated after more than one month by maintaining a bottom temperature above 170°C and adjusting the caprolactam content of the second subplot at not less than 75% by weight. Unexpectedly, it was found that maintaining the bottom temperature at 150°C (below 170°C) leads to a rapid increase in column deposits (12 hours). This result is unexpected because one skilled in the art would expect even more high boilers and deposits to be formed using higher temperatures. This unexpected result solves a technical problem and provides for a simpler and more cost-effective method for producing caprolactam. Because the claimed process gives unexpected results, the claimed process would not have been obvious over the combination of Achhammer and Ritz. Therefore, Applicants respectfully request that the Examiner withdraw the rejection.

In light of the comments contained herein, Applicants submit that the application is in condition for allowance. Favorable reconsideration is respectfully requested.

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Applicants have included fees for a two-month extension of time and believe no additional fees are due with this response. However, if any additional fees are due, please charge our Deposit Account No. 03-2775, under Order No. 12810-00088-US from which the undersigned is authorized to draw.

Dated: December 13, 2006

Respectfully submitted,

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